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METHODS OF DEALING WITH BIRTH-RATE STATISTICS.

EDITED BY CARROLL W. DOTEN.

While the question of a declining birth-rate, or, as it is usually expressed in newspaper discussion, "race suicide," has been somewhat overshadowed of late by railway rate regulation, insurance investigations, and the exposures of scandalous practices in many lines in the United States, it seems to have awakened renewed interest in the mother country. In a sense this is only one aspect of the keener appreciation and deeper study of general social problems and vital statistics which have been characteristic of English thought in recent years. Evidences of degeneracy in certain classes of the population were disclosed during the Boer War. England's commercial and financial leadership is no longer so supreme and impregnable as it once appeared to be. These and other causes have led to a sort of national introspection,—results of which are becoming manifest in many ways. This renewed interest in the birth-rate appears to the writer to be one phase of the self-examining process to which the nation is subjecting itself; but, whether it is so in fact or not, it seems worth while to call the attention of the readers of these publications and the members of this Association to some new methods which have been employed in investigations reported during the past year. Moreover, the results arrived at should awaken interest here, as they have in England, where an active newspaper discussion is at present being carried on with men like Karl Pearson and Sidney Webb as contributors.

The point of departure of this new interest and popular discussion was two excellent papers read before the Royal

Statistical Society at its meeting on Dec. 19, 1905, and published in full in its Journal, Vol. LXIX, Part 1, March 31, 1906. These papers were "The Decline of Human Fertility in the United Kingdom and Other Countries as shown by Corrected Birth-rates," by Arthur Newsholme, M.D., medical officer of health of Brighton, and T. H. C. Stevenson, M.D., assistant medical officer to the Education Committee of the London County Council; and "On the Changes in the Marriage and Birth-rates in England and Wales during the Past Half-century, with an Inquiry as to their Probable Causes," by G. Udny Yule, Newmarch Lecturer in Statistics, University College, London.

No mere review or summary could do justice to these papers. Therefore, it seems best to extract considerable portions of them for this publication.

The authors of the first paper explain the purpose of their investigation, and justify the calculation of a refined birth-rate, as follows:—

In dealing with birth statistics, one or other of two objects may be desired: to ascertain the rate of natural increase of a community, or to determine its fertility. The first object is achieved by deducting the crude death-rate from the birth-rate as ordinarily stated. The statistics thus obtained are of great importance as indicating the results of the natural forces at work. But they deal with results only, and if the forces themselves are to be made the subject of inquiry, a rearrangement of the facts and their statement in different terms from those of the crude birth- and death-rates are necessary. The corrected rate measures a force, the crude rate the result of the operation of this force. Thus in the case of death-rates the inherent tendency to mortality is measured, not by the crude, but by the corrected death-rate, the crude death-rate stating the result of the tendency to death acting upon a population of given age and sex constitution. The Registrar-General's reports have accustomed us to the distinction for death-rates, and we should not think of using crude death-rates in an index of mortality in this sense. But for birth-rates it is otherwise. The birth-rate as ordinarily stated, which will be referred to henceforward as the crude birth-rate, is still generally employed as the measure of the

tendency of a population to increase by natural means, no other measure being in most cases readily available. That such use is often entirely misleading will be abundantly proved by numerous specific instances in the course of this paper.

If a clue as to the future and an explanation of past experience is required, a method of stating the birth-rate analogous to that by which corrected death-rates are obtained is necessary. Such a birth-rate should be an accurate measure of the tendency of the community to increase, just as the corrected death-rate forms an accurate statement of its tendency to decrease. In other words, the corrected birth-rate must be a measure of fertility, which operating upon a population of given constitution as to age, sex and marriage, produces as its result the crude birth-rate.

In this paper we propose, first, to refer briefly to the method already described elsewhere by us which we have adopted for obtaining corrected birth-rates; secondly, to give exact birth-statistics for the different parts of the United Kingdom and for other countries in which all causes of non-comparability of data due to different ages at marriage and to number of wives at child-bearing ages shall have been eliminated; and, thirdly, to ascertain by a comparison of recent experience with that of twenty to twenty-two years earlier, the changes in fertility which have occurred, and the extent and distribution of these changes in different countries.

METHOD OF CALCULATING CORRECTED BIRTH-RATE.

Many years ago Dr. Farr stated the legitimate birth-rate in proportion to the number of married women aged 15-45 as comprising nearly all the child-bearing years, and in the annual report of the Registrar-General for 1903 this method is again adopted, and the statement is made that—

“The disturbing factor of changing constitution of the population is mainly, though not entirely, eliminated by calculating the proportion of births to the number of women living at child-bearing ages. This method of measuring the birth-rate shows the amount of the decrease to be far greater than is shown by the rates based on the total population.”

The above method fails, however, to make allowance for the varying fertility of wives at different ages. The magnitude of these differences is shown by the following table, compiled by Kőrösi:—

TABLE A.—NUMBER OF BIRTHS PER ANNUM PER 1,000 WIVES AT EACH AGE-PERIOD.

| Age of Mother. | Edinburgh and Glasgow, 1855. | Alsace- Lorraine, 1872. | Norway, 1874-76. | Finland, 1880-81. |
|-----------------|------------------------------------|-------------------------------|---------------------|----------------------|
| 15-20 | 500 | 465 | 413 | 379 |
| 20-25 | 418 | 563 | 579 | 406 |
| 25-30 | 346 | 463 | 430 | 357 |
| 30-35 | 266 | 388 | 360 | 322 |
| 35-40 | 204 | 282 | 300 | 261 |
| 40-45 | 80 | — | 181 | 158 |
| 45-50 | 13 | — | 33 | 27 |
| 50-55 | — | — | — | — |

| Age of Mother. | Brunswick, 1880-81. | Denmark, 1880-89. | Berlin, 1887-90. | Buda-Pest, 1889-92. | Sweden, 1891. |
|-----------------|------------------------|----------------------|---------------------|------------------------|------------------|
| 15-20 | 581 | 715 | 503 | 428 | 518 |
| 20-25 | 454 | 494 | 456 | 358 | 451 |
| 25-30 | 347 | 405 | 336 | 292 | 375 |
| 30-35 | 268 | 312 | 225 | 206 | 312 |
| 35-40 | 198 | 230 | 145 | 147 | 250 |
| 40-45 | 81 | 114 | 60 | 59 | 142 |
| 45-50 | 11 | 13 | 7 | 7 | 20 |
| 50-55 | — | — | 0.2 | 0.7 | — |

The general law of decline of fertility with advancing age is clearly shown in each of the above communities.

In the following table the same facts are set out in another manner, which enables the relative fertility at different ages in each community to be more easily appreciated. This table cannot, of course, be employed to compare the fertility in different communities.

TABLE B.—RELATIVE FERTILITY-RATES OF MARRIED WOMEN, THE FERTILITY-RATE FOR THE AGE-PERIOD 20-25 BEING TAKEN AS 100.

[The actual fertility-rate per 1,000 married women aged 20-25 is given in parentheses for each community.]

| Age of Mother. | Edinburgh and Glasgow | Alsace- Lorraine. | Norway. | Finland. | Brunswick. |
|-----------------|--------------------------|----------------------|--------------|--------------|--------------|
| 15-20 | 120 | 83 | 71 | 94 | 128 |
| 20-25 | { 100 (418) | 100 (563) | 100 (579) | 100 (406) | 100 (454) |
| 25-30 | 83 | 82 | 74 | 88 | 76 |
| 30-35 | 64 | 69 | 62 | 79 | 59 |
| 35-40 | 49 | 50 | 52 | 65 | 44 |
| 40-45 | 19 | — | 31 | 39 | 18 |
| 45-50 | 3 | — | 6 | 7 | 2 |

| Age of Mother. | Denmark. | Berlin. | Buda-Pest. | Sweden. | Average exclusive of Berlin and Buda-Pest. |
|-----------------|----------------|--------------|--------------|--------------|---|
| 15-20 | 145 | 111 | 120 | 115 | 108 |
| 20-25 | { 100 (494) | 100 (456) | 100 (358) | 100 (451) | 100 |
| 25-30 | 82 | 74 | 82 | 83 | 81 |
| 30-35 | 63 | 50 | 58 | 69 | 66 |
| 35-40 | 47 | 32 | 41 | 56 | 52 |
| 40-45 | 23 | 13 | 17 | 32 | 27 |
| 45-50 | 3 | 2 | 2 | 4 | 4 |

Figures like the above, if available for every community year by year, would give an exact determination of fertility. This is evident from Tables A and B, and a further example is given in Table C, in which, Sweden being taken as a standard, the course of events in New South Wales can be determined.

TABLE C.—LEGITIMATE FERTILITY-RATE OF NEW SOUTH WALES COMPARED WITH THAT OF SWEDEN, 1891, THE FERTILITY-RATE AT EACH AGE-PERIOD IN SWEDEN BEING STATED AS 100.*

| Age of Mother. | Sweden, 1891. | | New South Wales. Proportional Figures. | | | |
|-------------------|--|--------------------------|--|-------|-------|-------|
| | Birth-rate per 1,000 Wives at each Age. | Proportional Figures. | 1871. | 1881. | 1891. | 1901. |
| 15-20 | 518 | 100 | 87 | 89 | 83 | 97 |
| 20-25 | 451 | 100 | 98 | 102 | 93 | 88 |
| 25-30 | 375 | 100 | 109 | 108 | 95 | 80 |
| 30-35 | 312 | 100 | 108 | 109 | 94 | 73 |
| 35-40 | 250 | 100 | 108 | 110 | 94 | 69 |
| 40-45 | 142 | 100 | 95 | 91 | 83 | 62 |

Such figures are, however, only available in a few communities. In the United Kingdom our birth-returns unfortunately do not comprise a statement of the age of the father and the mother, of the duration of marriage and of preceding births, which are essential to complete birth-statistics. . . .

But even were the additional data indicated above available, the method of comparing fertility-rates at ages 20-25, 25-30, &c., il-

* The figures for New South Wales are calculated from a table given on p. 7 of "Report of Royal Commission on the Decline of the Birth-rate, etc., in New South Wales," vol. i, 1904.

illustrated in Table A, would be cumbrous and difficult, and would render a view *toute ensemble* almost impracticable. Furthermore, it would involve an elaborate annual recalculation, instead of the calculation of a factor of correction holding good for an entire intercensal period. It is necessary, in short, to have corrected birth-rates, correcting not only for differences of age and sex constitution, as the Annual Summaries of the Registrar-General do for death-rates, but also for differences of marital condition.

We have described a method by which these corrections can be made. Standard fertility-rates, those of Sweden in 1891 being adopted in this paper, are applied to the wives of the community whose true birth-rate is to be ascertained, and the births at each age-period 15-20, 20-25, 25-30, 30-35, 35-40, and 40-45, which according to this standard ought to occur, are thus ascertained. Thus, in Berkshire in 1901, according to the Swedish standard, 8,510 births should have occurred in its population of 283,531, and its standard birth-rate is, therefore, 30.01. The standard* birth-rate of England and Wales in 1901, similarly calculated, is 34.91, and this is employed throughout the present paper as the standard with which other birth-rates are compared. By this means the exact position of England and Wales in relation to fertility can at once be seen, when comparing it with its past experience, with the experience of its constituent parts, with that of the rest of the British Empire, and of other countries. The factor of correction stating the birth-rate of Berkshire in relation to that of England and Wales = $\frac{34.91}{30.01} = 1.1633$. The legitimate birth-

rate of Berkshire recorded in the Registrar-General's report for 1903 being 23.04, its corrected birth-rate becomes $23.04 \times 1.1633 = 26.80$.

The standard birth-rate takes into account both the ages and the number of the wives, and the resulting factor therefore corrects for both. By calculating and applying such factors of correction to the recorded or crude birth-rates of the communities dealt with, birth-rates exactly comparable with each other are obtained, which give the true fertility of each population, after all considerations as to the varying number and varying ages of the wives in each population have been eliminated.

... It is evident that these birth-rates will vary with three conditions: (1) The proportion of women aged 15-45 in the given population; (2) the proportion of these women who are married; and (3), to a less extent, the ages of these married women. For the present

* When not otherwise indicated, "birth-rate" throughout this paper signifies legitimate birth-rate.

we omit the consideration of the illegitimate birth-rate, as in regard to illegitimacy it is not, in the main, a problem of fertility. . . .

The above-mentioned method of correction does not eliminate any differences of fertility which may be caused by differences in the duration of marriage before the birth of each child. In England we have no data on this point, and no correction for this source of variation can be made. Were it otherwise, the discrepant experience in the communities, *e.g.*, Budapest and New South Wales, for which the information is available, would leave one in doubt as to whether it is justifiable to use any factor of correction on this account.

TABLE D.—BUDAPEST.* NUMBER OF CHILDREN BORN ANNUALLY TO 100 WIVES AT EACH AGE-PERIOD.

| | Age of Wives. | | | | | |
|--|---------------|--------|--------|--------|--------|--------|
| | 15-20. | 20-25. | 25-30. | 30-35. | 35-40. | 40-45. |
| Wives in the first year of marriage: | 20.4 | 26.7 | 30.9 | 32.9 | 32.7 | 20.4 |
| All wives | 42.8 | 35.8 | 29.2 | 20.6 | 14.7 | 5.9 |

TABLE E.—NEW SOUTH WALES.† NUMBER OF CHILDREN BORN ANNUALLY TO 100 WIVES AT EACH AGE DURING THE TEN YEARS 1891-1900.
(Intermediate Ages are Omitted.)

| | Age at Marriage. | | | | | |
|---|------------------|------|------|------|------|-----|
| | 20. | 25. | 30. | 35. | 40. | 45. |
| Wives in the first year of marriage | 39.7 | 36.2 | 25.6 | 14.4 | 5.8 | — |
| Wives with previous issue | — | 29.0 | 27.4 | 23.4 | 15.5 | 3.5 |

The fertility of the newly-married wives in Budapest is much lower than that of all wives at ages under 25, about equal to that of all wives 25-30, and higher at ages over 30. In New South Wales the fertility of newly-married women is higher than that of women with previous issue up to the age of 27, after which age it is lower, at first slightly lower, but at the age of 35 and upwards considerably lower.

* Kőrösi, "Philosophical Transactions, Royal Society," vol. 186 (1895) B., p. 808.

† T. A. Coghlan, Essay on the "Decline in the Birth-rate of New South Wales," p. 33 (1903).

The conditions in the two populations are in fact inverted, and it is clear that, if the experience of New South Wales were taken as a standard, any proposed correction of birth-rate for duration of marriage would be in the opposite direction to a correction based on the experience of Budapest.*

If some other standard fertility-rates than those of Sweden had been chosen, would the factors of correction have been materially different? . . . This has been tested somewhat elaborately by applying the fertility-rates given in Table A to test populations, as shown in Table F.

It will be seen that most of the corrected birth-rates in Table F, calculated on whatever basis, are remarkably close to each other, although the instances in this table were—excepting Essex, which was taken at random—specially selected, as likely to show the widest divergencies capable of being found, owing to unusual constitution of population, both as to age and married condition. Thus Glamorgan was selected because it has the highest proportion of its potential mothers married of any county; Scotland N., because it has the lowest proportion of wives of any of the divisions of Great Britain; Paris, because its birth-rate is not much more than one-third of what it should be on the Swedish basis.

When calculated by applying four sets of fertility-rates, the corrected birth-rates for the county of Essex only differ in the second place of decimals; those of Sydney, only between 21.57 and 21.65; of Paris, between 11.87 and 12.04; of Glamorgan, between 30.94 and 30.43. The corrected birth-rate of Scotland N., when calculated by applying eight different sets of fertility-rates, varies between 33.62 and 35.88; but this is a most exceptional and abnormally constituted population.

* M. Cauderlier has proposed a system of weighting birth statistics according to the duration of marriage. Thus, if the factor of correction for marriages of less than three years' duration be 1, it will be 0.66 in France and 0.8 in other countries for marriages of three to six years' duration, 0.33 in France, and 0.6 in other countries for marriages of six to nine years' duration, and so on. M. Lucien March, from whose paper in the Transactions of the International Congress of Hygiene and Demography at Brussels in 1903 the preceding statement is derived, gives the following coefficients for Austria:—

DURATION OF MARRIAGE.

| | Years | | | | | | |
|----------------|-------|------|------|-------|--------|--------|--------|
| | 0-3 | 3-6. | 6-9. | 9-12. | 12-15. | 15-18. | 18-21. |
| Weight | 1 | 0.86 | 0.72 | 0.58 | 0.44 | 0.30 | 0.16 |

TABLE F.—COMPARISON OF FERTILITY-RATES FOR WIVES AGED 15-45 BY THE APPLICATION OF VARIOUS SETS OF RATES TO CERTAIN POPULATIONS.

| 1 Population. | 2 Fertility-rates forming Basis of Correction. | 3 Standard Legitimate Birth-rate based on the Experience of Wives aged 15-45. | 4 Factor of Correction based on 3. | 5 Crude Legitimate Birth-rate. | 6 Corrected Legitimate Birth-rate based on 4. | 7 Standard Birth-rate Experience of Wives aged 15-50. | 8 Factor of Correction based on 7. | 9 Legitimate Birth-rate corrected by the Factor 8. |
|--|--|--|---|---|---|--|---|---|
| England and Wales, 1901 | Sweden, 1891 | 34.91 | 1 | — | — | 35.27 | — | — |
| | Finland, 1880-81 | 34.62 | 1 | — | — | 35.11 | — | — |
| | Norway, 1874-76 | 41.55 | 1 | — | — | 42.15 | — | — |
| | Denmark, 1880-89 | 35.33 | 1 | — | — | 35.57 | — | — |
| | Brunswick, 1880-81 | 30.35 | 1 | — | — | 30.55 | — | — |
| | Edinburgh and Glasgow, 1855 Berlin, 1887-90 | 29.84 26.99 | 1 1 | — — | — — | 30.08 27.12 | — — | — — |
| Essex registration county, 1901 | Budapest, 1889-92 | 23.91 | 1 | — | — | 24.04 | — | — |
| | Sweden, 1891 | 36.91 | 0.9458 | 29.42 | 27.83 | 37.27 | 0.9463 | 27.84 |
| | Norway | 43.92 | 0.9460 | 29.42 | 27.83 | 44.51 | 0.9470 | 27.86 |
| | Edinburgh and Glasgow | 31.55 | 0.9458 | 29.42 | 27.83 | 31.78 | 0.9465 | 27.85 |
| Sydney, 1901 | Budapest | 25.26 | 0.9466 | 29.42 | 27.85 | 25.39 | 0.9468 | 27.85 |
| | Sweden | 36.31 | 0.9614 | 22.45 | 21.58 | — | — | — |
| | Norway | 43.08 | 0.9645 | 22.45 | 21.65 | — | — | — |
| | Edinburgh and Glasgow | 31.05 | 0.9610 | 22.45 | 21.57 | — | — | — |
| Paris, 1901 | Budapest | 24.87 | 0.9614 | 22.45 | 21.58 | — | — | — |
| | Sweden | 44.26 | 0.7887 | 15.19 | 11.98 | — | — | — |
| | Norway | 52.44 | 0.7923 | 15.19 | 12.04 | — | — | — |
| | Edinburgh and Glasgow | 38.03 | 0.7846 | 15.19 | 11.92 | — | — | — |
| Scotland N., 1901 | Budapest | 30.59 | 0.7816 | 15.19 | 11.87 | — | — | — |
| | Sweden | 20.04 | 1.7420 | 19.57 | 34.09 | 20.37 | 1.7315 | 33.89 |
| | Finland | 20.15 | 1.7181 | 19.57 | 33.62 | 20.49 | 1.7135 | 33.53 |
| | Norway | 23.88 | 1.7399 | 19.57 | 34.65 | 24.42 | 1.7260 | 33.78 |
| | Denmark | 19.90 | 1.7754 | 19.57 | 34.74 | 20.11 | 1.7688 | 34.62 |
| | Brunswick | 16.94 | 1.7916 | 19.57 | 35.06 | 17.12 | 1.7845 | 34.92 |
| Glamorgan, 1901 | Edinburgh and Glasgow | 16.75 | 1.7815 | 19.57 | 34.86 | 16.96 | 1.7736 | 34.71 |
| | Berlin | 14.72 | 1.8336 | 19.57 | 35.88 | 14.83 | 1.8287 | 35.79 |
| | Budapest | 13.29 | 1.7991 | 19.57 | 35.21 | 13.40 | 1.7910 | 35.05 |
| | Sweden | 38.78 | 0.9002 | 34.31 | 30.89 | 39.11 | 0.9018 | 30.94 |
| Glamorgan, 1901 | Norway | 46.08 | 0.9017 | 34.31 | 30.94 | — | — | — |
| | Edinburgh and Glasgow | 33.46 | 0.8918 | 34.31 | 30.60 | — | — | — |
| | Budapest | 26.96 | 0.8869 | 34.31 | 30.43 | — | — | — |

The validity of the Swedish fertility-rates has been further tested by means of the figures in the last column in Table B, in which the rates for Berlin or Buda-Pest are not included, on account of their obviously artificial nature. All the other sets of fertility-rates in the table were compared, age by age, with the average, and the divergencies by way of excess or deficiency added together for each set. When this was done, the totals were found to be: Sweden, 21; Edinburgh, and Glasgow, 28; Brunswick, 51; Denmark, 51; Norway, 54; Finland, 62; and Alsace-Lorraine (four opportunities of divergence only), 31. This test, though a rough one, points to the Swedish rates being the most suitable of the series for standard purposes.

When comparing the Swedish rates with other rates in Table B, their most striking feature appears to be that the decline in fertility with advancing age is somewhat more gradual than that of most of the others. If this decline were too gradual to represent the normal state of matters, the effect would be to yield an unduly high standard birth-rate, and therefore an unduly low correction factor, in a population, such as that of Scotland N., with a high average age of wives aged 15-45; and, conversely, a low factor in a population, such as Glamorgan, where the wives marry young. These effects may be studied in Table F by comparing the correction factors obtained on the Swedish basis with those obtained on the basis of Edinburgh and Glasgow, where the diminution in fertility with advancing age is seen in Table B to be more rapid. But in this connection it must be noted that Table C shows that in New South Wales in 1871 and 1881, before artificial conditions had appeared in that country, the decline with advancing age was on the whole quite as gradual as in Sweden. The Swedish figures then, in spite of this peculiarity, appear to be perfectly applicable to the British race. Nor are they alone in manifesting this characteristic, which is exhibited to a much greater degree by the rates for Finland (Table B).

Two further points require to be noted in this preliminary consideration of methods. First, as to the non-inclusion of married women over 45. The English census figures for 1881 only gave facts as to marriage for women over 25 in ten-yearly age-groups, 25-35, &c., and in 1901 the same holds good for towns.* Hence the number of wives aged 45-

* It follows from the above statement that standard birth-rates were calculated in 1881 from the fertility-rates for 25-35, 25-45, instead of 25-30, 30-35, &c. These were derived from the Swedish rates for quinquennial periods by ascertaining the births yielded by the latter in the population of England and Wales (1901) in the age-periods 25-35 and 35-45, and from these numbers calculating the fertility-rates of the decennial age-periods. They were found to be 343 per 1,000 for 25-35 and 200 per 1,000 for 35-45. The error introduced by this larger grouping is very small. (See "Journal of Hygiene," 1905, p. 181.)

50 could not be ascertained. In Table F, column 9, are shown the results obtained by including wives aged 45-50 in the case of Essex and Scotland N. In Essex the greatest difference produced in the birth-rate is only 0.03; in Scotland N. the greatest difference is only 0.27.

Secondly, as to the method of obtaining the corrected illegitimate birth-rates (column 7, Table I, Appendix), and thence, by addition, the corrected total birth-rates (column 9). The proportion per 1,000 of population of women, not wives, aged 15-45, was ascertained for each community,* and the proportion, 132.7 per 1,000 in England and Wales, 1901, was taken as a standard. The crude illegitimate birth-rate per 1,000 of total population in each community was then reduced or increased in accordance with the excess or deficiency of the proportion of women not wives at child-bearing ages. In this case it will be noted that the correction, as in Dr. Farr's method, is only for numbers and not also for age; the proportion of the total birth-rate affected is so small that the further correction is an unnecessary refinement.

ILLUSTRATIONS OF NECESSITY FOR CORRECTED METHOD.

It must be remembered that by the method of calculation adopted in this paper the influence of differences in the proportion of wives and in the ages of these wives has been eliminated, and we are thus enabled to separate between what we may call the *arithmetical* and the *pathological causes* of decline in the birth-rate. France is the best instance of a pathological birth-rate. The term ("*natalité pathologique*") is used by Dr. Jacques Bertillon, the head of the Statistical Bureau of the City of Paris. France has rather a larger number of wives aged 15-45 than England and Wales per 1,000 of total population. But its corrected legitimate birth-rate is 29 per cent. lower, and its total corrected birth-rate 24 per cent. lower than that of England and Wales. Ireland, on the other hand, has a low crude birth-rate, which becomes one of the highest in Europe when correction is made, for the fact that only 76.5 per 1,000 of population as compared with 117.0 in England and Wales, are wives at child-bearing age, only 32.5 per cent. of the women aged 15-45 being married, as compared with 46.8 per cent. in England and Wales.

Illustrations of the changes produced by correction may be taken from the different countries represented in Table I, Appendix.†

* By subtracting in Table I the figure in column 11 from that in column 10.

† All the instances cited in this section relate to legitimate birth-rates.

Divisions of the United Kingdom.—It will be noted that both in 1881 and 1901 England and Wales had a population constituted so as to favor a higher birth-rate than that of other parts of the United Kingdom, Scotland, and more particularly South Scotland * and Scotland S.W. coming next, and Ireland and Scotland W. and Scotland N.W. having a population which necessitates a low birth-rate. The selected urban counties both in 1881 and 1901, and all the urban districts of England and Wales in the aggregate in 1901, had standard birth-rates favoring a high birth-rate, and the selected rural counties and all the rural districts in the aggregate had standard birth-rates favoring a low birth-rate. A study of columns 3 and 4 in Table I, Appendix, shows the importance of the use of factors of correction. Thus in 1881 Scotland N. had the lowest crude birth-rate of all the divisions of the United Kingdom given in the table, the correction removing it to a place next to the highest of all. Again, comparing 1881 with 1902-03, every crude birth-rate shows a decline, the least decline being 1 per cent. in Ulster, and the greatest 14 per cent. in Scotland N. and N.W. The corrected legitimate birth-rates, however, show an increased birth-rate of 7 per cent. in the corrected legitimate birth-rate of Munster, 13 per cent. in that of Connaught, 1 per cent. in those of Ulster and Leinster, and 3 per cent. in that of Ireland.

The authors draw further illustrations of this sort from a comparison of the crude and corrected birth-rates of the counties of England and Wales and the towns of the United Kingdom, of Australasia, and of foreign countries. These serve simply to sustain the points already made, and are omitted here because lack of space prevents the reproduction of the tables of the Appendix on which they are based.

COMPARISON OF FERTILITY OF THE SAME COMMUNITIES IN 1881 AND 1903, AND OF DIFFERENT COMMUNITIES WITH EACH OTHER.

So far we have been concerned with describing a correct method of stating fertility, and with a study of the differences in results obtained by the use of this method. A complete review of the facts relating to the communities enumerated in Tables I-VI, Appendix, can now be taken without any disturbing arithmetical considerations.

* Refer to footnote to Table I, Appendix, for meaning of these divisions.

The survey of such an enormous array of facts can be rendered less confusing by expressing the corrected birth-rate of each community in its ratio to that of one community taken as a standard. As the corrections made have been based on the fertility of Sweden in 1891, this has been taken as the standard, and a Figure of Merit is calculated for each community which expresses the relationship of its corrected legitimate birth-rate to the Swedish standard. This may be calculated in two ways, each giving the same result:—

1. The crude legitimate birth-rate of a community is stated as a percentage of its standard birth-rate; or

2. The corrected legitimate birth-rate of a community is stated as a percentage of the standard birth-rate of England and Wales. Thus, if the county of Durham is taken as an example:—

| | |
|--|---------|
| Durham, crude birth-rate in 1903 | = 34.25 |
| " standard " | = 38.04 |
| " corrected " | = 31.43 |
| England and Wales, standard birth-rate in 1901 | = 34.91 |

$$\text{Then } \frac{3143}{3491} = \frac{3425}{3804} = 0.90.$$

If the standard = 100, the Figure of Merit for Durham = 90. The Figure of Merit represents the proportion of potentiality to actuality, assuming—which is scarcely open to doubt—that the capacities for child-bearing are as high in the British as in the Swedish population. That this is so is indicated by the fact that the corrected Irish birth-rate is higher in 1903 than that of Sweden in 1891, and that of Scotland was so in 1881, and there is no reason to suppose that the potential birth-rate is higher in Scotland and Ireland than in England. Confirmation of this is furnished by the county figures given in the table on next page. It will be seen that in 1881 Rutland, Cumberland, Stafford, Cornwall, Westmoreland, and Oxfordshire all had corrected legitimate birth-rates above the Swedish standard (compare also Table C).

In the following pages communities will be compared among themselves (1) in 1881 and (2) in 1901–03. Contrast will then be made between 1881 and 1901–03.

It is convenient in the first instance to enumerate all the communities which both in 1881 and in 1901–03 were above the Swedish standard. They are as follows:—

Communities above the Swedish Standard of 1891 = 100.

| | 1881. | 1901-03. | | 1881. | 1901-03. |
|---|-------|----------|------------------------|-------|----------|
| Scotland N.W. | 117.4 | 103.8 | Cumberland | 103.1 | — |
| Bavaria | 113.3 | 101.9 | Scotland S.W. | 103.0 | — |
| Scotland N. | 112.4 | — | Munster | 102.9 | 109.9 |
| Belgium | 109.0 | — | South Scotland | 102.6 | — |
| Norway | 107.7 | 102.0 | Sweden | 101.9 | — |
| North Scotland | 107.5 | — | Cornwall | 101.6 | — |
| South Wales (excluding Glamorgan) | 105.1 | — | Stafford | 101.5 | — |
| Prussia | 104.7 | — | Westmoreland | 101.2 | — |
| New South Wales . . . | 104.6 | — | Denmark | 101.0 | — |
| Scotland | 104.5 | — | Saxony | 100.4 | — |
| German Empire | 104.4 | — | Oxfordshire | 100.4 | — |
| Rutland | 104.2 | — | Connaught | — | 108.8 |
| | | | Ireland | — | 101.9 |

It will be observed that only three countries, and a part of a fourth, remain above the Swedish standard of 1891, as against ten in 1881. Sweden itself has fallen 7 per cent. below its birth-rate in 1881.

Here we omit several tables of other countries and divisions of countries which fall somewhat below the standard in 1881. France, as we should naturally expect, stands at the bottom of the list with a "figure of merit" of 65.1. These tables are followed by others consisting of counties and cities, and here again the French appear at the foot of the list.

Only two urban communities in our list were 20 *per cent.* below the standard:—

Kensington 78.8 Paris 47.1

It is evident that the birth-rate in towns was commonly lower in 1881 than in the countries or counties in which they are situate. It is interesting to inquire how far their birth-rate is intentionally * lowered. The case of Dublin is important, as indicating that in a population which is chiefly Roman Catholic, among whom the artificial prevention of pregnancy is banned, there may be a deficiency of 9.5 per cent. below a moderate standard, without, so far as can be surmised, a very considerable use of such measures. That this surmise is correct is confirmed by the fact that in 1903 the corrected

* It is scarcely necessary to say that the word "intentionally" does not include postponement of marriage, as this and other automatic causes of change in the birth-rate have already been eliminated.

birth-rate of Dublin was only 1 per cent. below the standard. Belfast, on the other hand, in 1881 was 3.6 and in 1903 was 4.8 per cent. below the standard. The experience of Dublin in 1881 is probably exceptional. It may have been caused by special local circumstances. The fact that the birth-rate of Dublin in 1903 was within 1 per cent. of the standard, does not appear to favor the view that urban are normally lower than rural birth-rates.

The last eight in the above list of towns are especially interesting. The social position of these towns varies greatly. Thus Huddersfield, Halifax, and Bradford form one group, Berlin a second, Brighton and Kensington a third, and Paris stands alone. Berlin in 1881 (19 per cent. below the standard) may advantageously be compared with Prussia (4.7 per cent. above it). Some cause was operating in Berlin and to a less extent in Hamburg, which was not felt in Prussia as a whole. Edinburgh, 5.7 per cent. below, as compared with Scotland, 4.5 per cent. above the standard, and London, 11.4 per cent. below, as compared with England and Wales, 6.2 per cent. below the standard, show the same phenomenon in a minor degree. The selected rural counties had a birth-rate 2.3 per cent. and the selected urban counties 8 per cent. below the standard; and, speaking generally, the corrected birth-rate in towns in 1881 was lower than that of countries as a whole, and therefore still less than that of rural districts.

1901-03.

Countries and Divisions of Countries in Order of Figure of Merit, 1901-03.

We have already seen that Norway, Bavaria, and Ireland, and Scotland N.W. were still over the standard.

The following were *within 5 per cent. below the standard*:—

| | | | |
|---------------------|------|--------------------|------|
| Ulster | 98.8 | Leinster | 97.4 |
| Scotland N. | 97.7 | | |

. . . The following were *over 20 per cent. below the standard*:—

| | | | |
|-----------------------------------|------|---------------------------|------|
| England and Wales | 78.2 | Victoria | 73.8 |
| Selected Urban Counties | 77.9 | New South Wales | 70.5 |
| Saxony | 76.2 | France | 55.3 |

. . . The facts that the corrected birth-rate of Victoria is 26.2 per cent., of New South Wales is 29.5, and of New Zealand is 18.5 per cent. below the standard, that the corrected birth-rate of England and Wales is 21.8 per cent. below, that of Scotland 9.3 per cent. below,

and that of Ireland 1.9 per cent. above the standard, are of imperial importance.

Here follows a list of counties and towns in the "order of figure of merit" in 1903. What impresses one at first sight is that these counties and towns are much further below the standard than they were in 1881. For example, in that year only two urban communities were 20 per cent. below the standard. In 1903, out of the 45 towns mentioned, 33 are more than 20 per cent. below the standard, 19 being more than 30 per cent. and 4 more than 40 per cent. below. Speaking of the especially low record of some of these towns, the authors comment as follows:—

Hampstead, 45 per cent. below, Bournemouth, 37 per cent. below, and Kensington and Paddington, 35.9 per cent. below the standard, bear company with the less aristocratic Halifax, which is 43.7 per cent. below the standard. Paris, 65.7 per cent. below the standard, stands in inglorious solitude. Hamburg, 37.8 per cent. below, and Berlin, 46.8 per cent. below the standard, should be contrasted with the German Empire, 8.3 per cent. below, and Prussia, 6.3 per cent. below the standard. Whatever cause is operating in Germany to produce a low birth-rate is at present confined chiefly to great urban centres. This is in marked contrast to the experience of England and its colonies, in which the reduction of birth-rate is much more widespread.

CONTRAST OF 1881 WITH 1901-03.

Having compared communities between themselves in 1881 and in 1901-03 respectively, it is now necessary, in order to complete the picture, to ascertain the relative position of each community at the two periods.

Countries and Divisions of Countries, 1881 and 1901-03.

An increase of corrected legitimate birth-rate was shown in the following:—

| | <i>Per Cent.</i> | | <i>Per Cent.</i> |
|------------------------------|------------------|---------------------------|------------------|
| Connaught (96.2) * | 13 | Ulster (98.1) | 1 |
| Munster (102.9) | 7 | Leinster (96.8) | 1 |
| Ireland (99.1) | 3 | | |

* In this and the following lists the figure representing the Figure of Merit in 1881 is given in parentheses, so that in each case it can be seen whether the percentage increase or decline is from a high or low original position.

Ireland and all its divisions alone among all the countries for which figures could be obtained show an increased fertility. Such are the wonders effected by a corrected statement, although the crude legitimate birth-rate of Ireland in 1903 was 22.5, and that of England and Wales 27.3 per 1,000 of population. The low crude birth-rate of Ireland is owing to the fact that a large proportion of the child-bearing population of Ireland has been transferred to America. Those remaining in Ireland who are of child-bearing age are adding to the population at a much higher rate than the corresponding population of England, as shown by the fact that the corrected legitimate birth-rate of Ireland is 35.6 and that of England and Wales 27.3 per 1,000 of population. They are also adding to the population of Ireland at a higher rate than in 1881. . . .

The other countries may be classified according to percentage decline in corrected birth-rate between 1881 and 1901-03 as follows:—

5-10 *per cent.*:—

| | <i>Per Cent.</i> | | <i>Per Cent.</i> |
|--------------------------|------------------|------------------------|------------------|
| Sweden (101.9) | 7 | Italy (95.7) | 7 |

10-15 *per cent.*:—

| | <i>Per Cent.</i> | | <i>Per Cent.</i> |
|----------------------------------|------------------|---------------------------------|------------------|
| Scotland S.W. (103.0) | 10 | German Empire (104.4) | 12 |
| Bavaria (113.3) | 10 | South Wales * (105.1) | 12 |
| Prussia (104.7) | 11 | Scotland N. (112.4) | 13 |
| South Scotland (102.6) | 12 | Scotland (104.5) | 13 |
| Scotland N.W. (117.4) | 12 | North Wales (97.2) | 13 |

15-20 *per cent.*:—

| | <i>Per Cent.</i> | | <i>Per Cent.</i> |
|----------------------------------|------------------|------------------------------------|------------------|
| Denmark (101.0) | 15 | England and Wales (93.8) | 17 |
| France (65.1) | 15 | Selected rural counties of Eng- | |
| North Scotland (107.5) | 15 | land and Wales (97.7) | 18 |
| Selected urban counties of Eng- | | New Zealand (99.9) | 18 |
| land and Wales (92.0) | 15 | | |

20-25 *per cent.*:—

| | <i>Per Cent.</i> | | <i>Per Cent.</i> |
|---------------------------|------------------|---------------------------|------------------|
| Saxony (100.4) | 24 | Victoria (98.1) | 25 |
| Belgium (109.0) | 24 | | |

Over 25 *per cent.*:—

| | <i>Per Cent.</i> |
|-----------------------------------|------------------|
| New South Wales (104.6) | 33 |

The preceding figures in the main tell their own tale, if the figures in parentheses, indicating the relative position from which the decline has occurred, be kept in view. . . .

* Excluding Glamorganshire.

Tables giving decrease in the counties of England and Wales, and also all towns in the following list except those in the highest and lowest classes, are omitted here. No county showed an increase.

Towns, 1881 and 1903.

One town, Dublin, has improved its position, showing an increase of 9 per cent. on 1881 (90.5). In two the *decline has been less than 5 per cent.*:—

| | <i>Per Cent.</i> | | <i>Per Cent.</i> |
|--------------------------|------------------|----------------------------|------------------|
| Belfast (96.4) | 1 | Liverpool (89.0) | 4 |

. . . 25 per cent. and over:—

| | <i>Per Cent.</i> | | <i>Per Cent.</i> |
|----------------------------|------------------|------------------------------|------------------|
| Bradford (80.8) | 26 | Burnley (93.8) | 32 |
| Leicester (91.2) | 26 | Halifax (83.4) | 32 |
| Derby (93.2) | 27 | Northampton (93.8) | 32 |
| Paris (47.1) | 27 | Berlin (81.0) | 34 |
| Hamburg (89.8) | 31 | Hampstead (85.3) | 36 |
| Blackburn (95.7) | 32 | | |

The percentages scarcely need detailed comment, as they tell their own story. Dublin alone has improved its position. The other towns showing a decline under 10 per cent. all, with the possible exception of Bethnal Green, have a large proportion of Irish in their populations. . . .

We may broadly say that Paris anticipated by many years the experience of other cities and towns, but that most other towns are pursuing the same course at varying intervals and with lagging or hastening pace. Many towns—for instance, Berlin, Bradford, Brighton, Halifax, Hampstead, Kensington, and Oldham—had already arranged in 1881 for a low birth-rate. The majority of towns have now started on the same course.

Omitting the discussion of the decline in the illegitimate birth-rate between 1881 and 1903, which was generally more marked than that of the legitimate, the conclusions arrived at by the authors as a result of their study may be summarized.

It is evident that human fertility is on the decline in practically every community. This does not appear in the form of an increased number of sterile marriages so much as in

that of smaller families.* This points to conscious limitation rather than to physiological infertility. The standard birth-rate has declined faster in rural England than in the cities since 1881. This tends to show that *urbanization* will not account for the general decrease. The exceptional case of Germany, where the reverse of this is true, is held to be due to the fact "that the operative causes of a low birth-rate have not yet affected the rural population of that country to any great extent." *Industrial conditions* and *race* do not account for the changes. *Religion* seemed to have no connection with the variations in birth-rate in 1881, but in 1902-03 Roman Catholic countries show the least tendency toward a decline.

It was found that there is a close relationship between *social conditions*, particularly the degree of prosperity, and fertility as regards classes in the same community, but that the evidence was not convincing where large communities or countries were compared. The following tables show this:—

Dr. Bertillon has since kindly supplied to one of us the following statement of the number of legitimate births per 1,000 married women aged 15-50 in Paris and Berlin:—

TABLE I.

| Classification. | Paris. | Berlin. |
|-------------------------------------|--------|---------|
| Very poor quarters | 143 | 214 |
| Poor quarters | 128 | 198 |
| Comfortable quarters | 109 | 192 |
| Very comfortable quarters | 96 | 172 |
| Rich quarters | 94 | 145 |
| Very rich quarters | 65 | 121 |

In the following table we have made a similar calculation for London, substituting the more complete correction described in this paper for the method of correction used in Table I. The metropolitan

* The authors cite A. A. Young's paper on the birth-rate in New Hampshire which appeared in No. 71 of these Publications, in support of this assertion.

boroughs have been divided into six groups, which generally resemble Dr. Bertillon's groups. The classification has been based on the average number of domestic servants to every 100 families as displayed by the census returns for 1901.

TABLE J.—GROUPS OF METROPOLITAN BOROUGHs.

| | Number of Domestic Servants per 100 Families. | Corrected Birth-rate, 1903. | | | Relative Corrected Birth-rate, that of London being taken as 100. | |
|-----------|---|-----------------------------|---------------|--------|---|---------------|
| | | Legitimate. | Illegitimate. | Total. | Legitimate. | Illegitimate. |
| Group 1 . | under 10 | 30.78 | 0.78 | 31.56 | 118.8 | 85.7 |
| " 2 . | 10-20 | 24.81 | 1.01 | 25.82 | 95.8 | 111.1 |
| " 3 . | 20-30 | 24.90 | 0.73 | 25.63 | 96.1 | 80.2 |
| " 4 . | 30-40 | 24.82 | 0.68 | 25.50 | 95.8 | 74.7 |
| " 5 . | 40-50 | 23.62 | 1.74 * | 25.36 | 91.2 | 191.2 |
| " 6 . | over 60 | 20.04 | 0.41 | 20.45 | 77.3 | 45.1 |
| Total | — | 25.91 | 0.91 | 26.82 | 100.0 | 100.0 |

. . . It will be observed that groups 2, 3, 4, and 5, comprising 64.8 per cent. of the total population of London, had a corrected total birth-rate which only varied between 25.36 and 25.82. The two extreme groups show marked differences, the rich districts at one end of the scale having a corrected total birth-rate of 20.45, and the very poor districts at the other end of the scale a corrected total birth-rate of 31.56 per 1,000 of population. The former of these birth-rates affects 9.7 per cent., the latter 25.4 per cent., of the total population of London.

The above facts suggest the conclusion that among the rich in London the prevention of child-bearing is systematically and largely practised, that among the very poor the practice is probably almost unknown, and that the mass of the population which lies between these two social extremes occupies an intermediate position in regard to such preventive measures.

SOCIAL SUICIDE.

The last sentence anticipates the general conclusion to which an impartial view of the whole field of corrected facts seems to us inevitably to lead.

* The excessive illegitimate birth-rate in Group 5 was due entirely to the high rate in Marylebone, in which is situate Queen Charlotte's Lying-in Hospital.

The decline of birth-rate is not due to increased poverty.

It is associated with a general raising of the standard of comfort, and is an expression of the determination of the people to secure this greater comfort.

It is not caused by greater stress in modern life, but is a consequence of the greater desire for luxury. Possibly the raising of the age for leaving school, and allied changes as to work, have aided in producing the result by preventing children from being an early source of profit. These and allied motives have made parents look round for the means of keeping their families within "prudent" limits. The gradual slackening of the religious restraints, which were formerly to a much greater extent associated with family life, have doubtless aided in making husbands and wives willing to utilize such preventive means as they have been able to discover. Increased education has helped in securing access to the necessary information, and the greater aggregation of populations in towns has doubtless supplied not only increased facilities for the communication of information on the subject, but also for the purchase of the necessary appliances. Many druggists are stated to make a large share of their income in this way.

A marked impetus in this direction was given in England by notorious trials in 1877. The special experience of towns like Halifax, Huddersfield, and Northampton implies, and is known to be associated with, a special local propagandism. What caused the earlier implication of France in this policy of short-sighted prudential selfishness it would be beyond the scope of this paper to discuss. . . . And with this we must look for a lower standard of moral outlook, a lowering of the ideal of married life, and a consequent deterioration of the moral, if not also of the physical, nature of mankind. France has anticipated the rest of the world, and has thus come near the consummation of its social *felo-de-se*. But it is only a question of decades, in the absence of a great change in the moral standpoint of the majority of the people, before others follow in the same direction, possibly even at the same pace. The outlook is gloomy, and we cannot look with confidence to the help which is likely to come either from preaching or medical teaching. . . .

The following table and postscript are reproduced because of their peculiar interest to Americans. Here we see applied to our own population problems this new method of measuring fertility. The results will confirm the fears of those who have been warning the American people against race suicide.

TABLE VII.—CERTAIN AMERICAN STATES AND CITIES.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|----------------------------------|---------------------------------------|---|------------------------------------|--|--|--------------------------------------|--|-------------------------------|-----------------------------------|---------------------------|-------------------------|---|
| | Standard Legitimate Birth-rate. | Factor for Correction of Crude Legitimate Birth-rate. | Crude Legitimate Birth-rate. | Corrected Legitimate Birth-rate. | Factor for Correction of Illegitimate Birth-rate. | Crude Illegitimate Birth-rate. | Corrected Illegitimate Birth-rate. | Crude Total Birth-rate. | Corrected Total Birth-rate. | Females Aged 15-45. | Wives Aged 15-45. | Wives Aged 15-45 per Cent. of all Females of same Age. |
| Boston 1900 | 39.04 | 0.8942 | — | — | — | — | — | 29.15 | 26.07 | 277.2 | 128.8 | 46.4 |
| Rhode Island { 1900 | 38.62 | 0.9039 | 25.55 | 23.09 | 1.002 | 0.35 | 0.35 | 25.90 | 23.46 | 259.6 | 137.2 | 49.0 |
| { 1875 | 41.87 | 0.8338 | 23.94 | 19.96 | 1.037 | 0.24 | 0.25 | 24.18 | 20.21 | 261.7 | 133.7 | 51.1 |
| Providence . { 1900 | 39.34 | 0.8874 | 25.49 | 22.62 | 0.911 | 0.47 | 0.43 | 25.96 | 23.05 | 275.3 | 129.7 | 47.1 |
| { 1875 | 43.86 | 0.7959 | — | — | — | — | — | 26.46 | 21.06 | 278.3 | 140.4 | 50.5 |
| Boston: Native-born . 1900 | 28.42 | 1.2284 | 14.82* | 18.20 | — | — | — | — | — | 239.0 | 92.6 | 38.8 |
| Foreign-born 1900 | 58.96 | 0.5921 | 52.46* | 31.06 | — | — | — | — | — | 351.2 | 196.6 | 56.0 |
| Rhode Island: Native-born . 1900 | 30.88 | 1.1305 | — | — | — | — | — | 15.09† | 17.01 | 232.8 | 100.6 | 43.2 |
| Foreign-born 1900 | 55.67 | 0.6271 | — | — | — | — | — | 49.37† | 30.96 | 318.8 | 185.6 | 58.2 |
| Providence: Native-born . 1900 | 31.01 | 1.1258 | 14.24*† | 16.00 | — | — | — | — | — | 250.1 | 101.4 | 40.5 |
| Foreign-born. 1900 | 57.36 | 0.6086 | 51.06*† | 31.08 | — | — | — | — | — | 330.4 | 190.8 | 57.8 |
| Native-born . 1875 | 37.24 | 0.9374 | — | — | — | — | — | 17.18‡ | 16.10 | — | — | — |
| Foreign-born. 1875 | 61.74 | 0.5654 | — | — | — | — | — | 49.15‡ | 27.79 | — | — | — |

NOTE.—All birth-rates are for 1900 and 1875 except where otherwise stated.

* Births of known parentage.

† Births in 1901.

‡ In this case all births of foreign mothers and native fathers are credited to foreign-born population, and all of native mothers and foreign fathers to native-born population. This fact leads to a slight underestimation of the difference in fertility of the native and foreign populations as compared with the 1900 results.

Postscript on American Results (3d January, 1906).

Few States record their birth-rates accurately. Those doing so belong chiefly, if not entirely, to the New England group, and it is to the State of Rhode Island and the cities of Boston and Providence in this group that our attention has been directed.

We have been able to compare 1875 with 1900 in the case of Rhode Island and its capital, Providence. The corrected birth-rates for the former are:—

| | |
|----------------------|---------------------------------|
| Legitimate | 19.96 in 1875 and 23.09 in 1900 |
| Total | 20.21 in 1875 and 23.46 in 1900 |

and for the latter:—

| | |
|----------------------|---------------------------------|
| Legitimate | ? in 1875 and 22.62 in 1900 |
| Total | 21.06 in 1875 and 23.05 in 1900 |

Thus, while these American rates are exceedingly low, they differ from the great mass of other birth-rates examined by us in showing a tendency to increase. This tendency can also be seen in the official crude rates. To what extent it may be due to increasing efficiency of registration we are not in a position to judge.

American birth registration, when secured at all, gives much more information than our records; *e.g.*, age and nationality of parents. The returns on the latter point render it possible to demonstrate the extent to which the native and foreign elements in the population are respectively contributing to the birth-rate. The following results have been obtained:—

Boston, 1900.

| | <i>Birth-rate.</i> |
|------------------------|--------------------|
| Native born | 18.20 |
| Foreign born | 31.06 |

Providence, 1901.

| | <i>Birth-rate.</i> |
|------------------------|--------------------|
| Native born | 16.00 |
| Foreign born | 31.08 |

These are corrected birth-rates founded upon all births recorded where the nationality of both parents was known:—

Rhode Island, 1901.

| | <i>Birth-rate.</i> |
|------------------------|--------------------|
| Native born | 17.01 |
| Foreign born | 30.96 |

These are corrected birth-rates founded upon all the births of the year as divided into native, foreign, and mixed births in a table in the official registration report for 1903.

[The year 1901 was selected in the case of Providence and Rhode Island as being nearer the census date, 1st June, 1900, than 1903, and the foreign and native born sections of the population are assumed to have increased in equal proportions during the intervening year.]

Thus in all three cases the foreign is almost double the native birth-rate, the latter being about as low as that of Paris.

But this difference, startling as it is, does not adequately represent the contrast between the fertilities of the foreign and native sections.

(1) It was thought best to get over the difficulty of births of mixed parentage by adding half of them to the native and half to the foreign births. This, in the light of the preceding statistics, must be regarded as having the effect of somewhat increasing the native and decreasing the foreign true total of births. In some unascertainable proportion a larger number of the resulting births should have been credited to the foreign than to the native population. The number of such mixed births is considerable.

(2) It may, perhaps, be assumed that the whole of the imported excess of fertility is not lost in the first generation, and that the natives born of foreign parentage are more fertile than natives born of native parentage. If this be so, it may well mean that the corrected birth-rates for the latter section of the communities are considerably lower than 16-18, the rates for the whole of the native born, inasmuch as the native born of foreign parentage exceed in number those of native parentage.

The chief bearing of these two points is on the relative fertility of the native and foreign populations of these American communities. But it has also to be remembered that the actual contribution of the two sections to the populations is not represented by their fertilities. The proportion of married to total women aged 15-45 varies in Boston, Providence, and Rhode Island from 38.8 to 43.2 per cent. for the native born, and from 56.0 to 58.2 for the foreign born. The rate of increase of the native born population is therefore less than the corrected birth-rates alone indicate. The crude birth-rate in each of the above three communities is about 15 per 1,000; for the really American element it must, in view of the above considerations, be considerably below this figure. It is almost certain, therefore, that this element is actually decreasing in these populations.

Contrast this condition of things with that of Paris. This city has a corrected birth-rate of 16.65, not very different from that of the

above three American communities; but a crude birth-rate—owing to its larger proportion of women married—of 20.6.

It is evident, then, that, taking into consideration the probable understatement of the facts in the American results, the condition of voluntary prevention of child-bearing in the native populations of Rhode Island and Boston has gone far beyond that reached by Paris. Whether it has touched bottom, as indicated by the registered increase of the birth-rate since 1875, or whether this increase is caused by greater completeness of registration, must be regarded as doubtful. In view of the much higher percentage of married amongst the foreign than the native born, it is of interest to compare the marriage figures of native born of native parents and native born of foreign parents. In this case, contrary to what one would have expected, the rates are much higher for the former class,—45.8 against 35.4 in column 12 for Providence, 1900; and 42.1 against 33.5 for Boston.

It will be impossible to extract so largely from Mr. Yule's paper because of the large number of diagrams which it contains. Moreover, a considerable portion of it is taken up with a discussion of the changes in marriage-rates, and it is only in the latter part of his paper that he attacks the same problem as the other writers.

In his treatment of this question he makes use of different correction factors, but in general his results and conclusions do not differ materially from those arrived at by Messrs. Newsholme and Stevenson. He shows by a diagram the course of the crude birth-rate in England and Wales from 1850 to 1900. There was a gradual rise in the legitimate birth-rate from about 33 per 1,000 in 1850 to 36.3 in 1876, followed by a practically continuous fall to 28.7 in 1900.

The first problem is to find how far the changes in the legitimate rate have been effected by changes in the proportion of married women to the population and in their relative ages, and how much by other causes. The changes in the number of married women per million persons living are shown in Table III, a table taken from the General Report of the last Census. It will be seen that they have been by no means so considerable as the changes in the proportions of unmarried, and less regular, but of some importance. The proportion rose by some 3 per cent. from 1851 to 1871, fell by about $2\frac{1}{2}$ per cent. to 1891,

TABLE III.—MARRIED FEMALES PER MILLION PERSONS LIVING.

[Census 1901, General Report.]

| Age. | 1851. | 1861. | 1871. | 1881. | 1891. | 1901. |
|--------------|---------|---------|---------|---------|---------|---------|
| 15-20 . . . | 1,241 | 1,481 | 1,522 | 1,248 | 995 | 781 |
| 20-25 . . . | 14,954 | 16,007 | 15,908 | 15,477 | 14,287 | 13,769 |
| 25-35 . . . | 51,235 | 51,841 | 52,090 | 51,735 | 51,502 | 54,754 |
| 35-45 . . . | 44,361 | 46,272 | 44,989 | 44,860 | 45,053 | 47,641 |
| 45-55 . . . | 30,666 | 31,987 | 32,655 | 31,201 | 31,767 | 32,647 |
| 55-65 . . . | 17,270 | 17,800 | 18,164 | 18,146 | 17,508 | 18,119 |
| 65- . . . | 8,485 | 8,484 | 8,522 | 8,202 | 8,414 | 8,063 |
| All ages . . | 168,212 | 173,872 | 173,850 | 170,859 | 169,526 | 175,774 |

and then rose sharply again by $3\frac{1}{2}$ per cent. during the last decade of the century. The fall from 1871 to 1891 is largely due to the falling marriage-rate, the rise from 1891 to 1901 to the fallen birth-rate, which has decreased the proportion of the young and correspondingly thrown up the proportion of the older, both married and unmarried.

If we reduce the legitimate birth-rates in the several census years to the proportion of married women in 1901, we obtain the results shown in Table IV. In column 3 are given the correction-factors 175,774/168,212, &c., and in column 4 the legitimate birth-rate as

TABLE IV.—REDUCTION OF THE LEGITIMATE BIRTH-RATE TO (1) THE TOTAL PROPORTION OF MARRIED WOMEN IN 1901; (2) THE PROPORTION OF MARRIED WOMEN UNDER 45 YEARS OF AGE.

| 1 Year. | 2 Legitimate Birth-rate. | 3 Correction Factor for Proportion of Married Women. | 4 Column 2 corrected by Column 3. | 5 Correction Factor for Married Women under 45. | 6 Column 2 corrected by Column 5. |
|--------------|--------------------------------|--|--|---|--|
| 1851 | 31.4 | 1.045 | 32.8 | 1.046 | 32.8 |
| 1861 | 32.4 | 1.010 | 32.8 | 1.012 | 32.8 |
| 1871 | 33.0 | 1.012 | 33.4 | 1.021 | 33.7 |
| 1881 | 32.2 | 1.029 | 33.0 | 1.032 | 33.2 |
| 1891 | 30.1 | 1.037 | 31.2 | 1.046 | 31.5 |
| 1901 | 27.4 | 1 | 27.4 | 1 | 27.4 |

corrected. The general effect is to diminish the rise between 1851 and 1871 and the fall between 1871 and 1881, leaving the final fall between 1881 and 1891 larger and more abrupt. The changes in the pro-

portion of married women to the population would seem, therefore, to be partly responsible for the earlier rise and the commencement of the fall, and some other cause for the final fall, which has in fact been partly masked by a rise in the numbers of married women. If we further take account of the changes in the ages of married women in a very rough fashion, by simply neglecting those who are over forty-five years of age, the same result is still further emphasized, as shown in columns 5 and 6. The correction factors are larger than before, and the fall between 1891 and 1901 is increased from 2.7 in the crude rate to 4.1 in the corrected rate.

But it is desirable to obtain, if possible, a more complete correction, allowing the proper weights in each year to the married women of different ages in proportion to their fertility. Unfortunately there are no official data in this respect for England; and, if the correction be made at all, it must be made on the basis of unofficial data, or official data for some other country. . . . In 1855, when systematic registration of births in Scotland was first established, the schedule in use was much more elaborate than the present one, and demanded, amongst other information, the age of the mother. The data so obtained were reduced by Dr. Duncan for legitimate births in Edinburgh and Glasgow in that year by comparison with the census returns for 1831 and 1861, and he further handed over the reduced data to Professor Tait, who contributed some mathematical chapters to the book. Professor Tait pointed out at once that an extremely simple law seemed to express, within the limits of error, the fertility of these married women at different ages; namely, *the percentage of wives of any one age who are mothers within one year varies directly as the difference between that age and fifty*. In symbolic form, if f_t is the percentage of wives of age t who are mothers within a year,

$$f_t = k(50 - t)$$

For the Edinburgh and Glasgow women Professor Tait found k , which may evidently be treated as a kind of "coefficient of fertility," equal to 1.5. . . .

I do not suppose this law to be anything but a rough empirical formula, giving the results sufficiently closely for the age-groups used. . . . But for the purposes of weighting a very exact law is not essential,—one may even say not possible, for the form of the law itself may be subject to change,—and I think Tait's law possesses all the accuracy needful. Further, the simple linear law has two great advantages: (1) it permits of the immediate calculation of the relative fertilities of groups of any age-limits without the necessity of interpolating be-

tween observed results,—a very useful property where different census returns give different groupings; and (2) it introduces a “coefficient of fertility” with a direct and simple physical meaning. I have not attempted to apply the law to other countries than England, and cannot say how far such an application may be legitimate. . . .

The age-groups for married women given in the English census (Table III) are 15–, 20–, 25–, 35–45, and for these groups Tait’s law gives the percentages of wives bearing children in each year as 49, 41, 30, and 15. Taking these percentages on the number of married women in each age-group to a million living as given in Table III, we can calculate the birth-rate to be expected on the basis of Tait’s law. This is a measure of the *potential fertility of the population*, taking into account the numbers and ages of the married women only.

The results of the calculation are given in Table V. The potential birth-rate reached a maximum in 1861, fell steadily to 1891, and rose sharply again in the last decade of the century,—a rise indirectly due, as we have seen, to the fallen birth-rate. Reducing the actual birth-rates in successive census years to the potential birth-rate of 1901 by the factor of column 4, the corrected rates of column 5 are obtained. If these are compared with the more roughly corrected rates of Table IV, columns 4 and 6, it will be seen that they are a little lower than either in the earlier years; and, curiously enough, run closer to the rates corrected by grand totals of married women (column 4) than to those corrected by totals of married women under 45 (column 6). . . .

The values of the coefficients of fertility k are given in the last column, and again emphasize the great magnitude of the drop in fertility during the last decade. The coefficient fell only 0.01 between 1871 and 1881, 0.08 in the next decade, 0.19 in the last. For some reason or other the actual fecundity of married women has been falling with increasing rapidity during the past thirty years, and it is to this, and to no mere changes in the proportion of married women to the population, that the fall in the rate is due. The rate of acceleration of the fall is, however, a little exaggerated by the preceding figures, for the birth-rates used in Table V are rates for single years, and the rate for 1891 was exceptionally high; if averages for the three years 1850–52, 1860–62, &c., be taken to minimize irregularities, Tait’s coefficients were 1.64, 1.63, 1.69, 1.66, 1.55, 1.39. The values for 1871 and 1891 are the only ones altered, and the differences since 1871 were 0.03, 0.11, 0.16.

TABLE V.

| 1 | 2 | 3 | 4 | 5 | 6 |
|--------------|------------------------|---------------------------------------|----------------------------|---------------------------------|--------------------------|
| Year. | Legitimate Birth-rate. | Potential Birth-rate from Tait's Law. | Correction Factor to 1901. | Column 2 corrected by Column 4. | Tait's Coefficient k . |
| 1851 | 31.4 | 28.76 | 1.029 | 32.3 | 1.64 |
| 1861 | 32.4 | 29.78 | 0.994 | 32.2 | 1.63 |
| 1871 | 33.0 | 29.64 | 0.998 | 32.9 | 1.67 |
| 1881 | 32.2 | 29.20 | 1.014 | 32.6 | 1.66 |
| 1891 | 30.1 | 28.55 | 1.037 | 31.2 | 1.58 |
| 1901 | 27.4 | 29.60 | 1 | 27.4 | 1.39 |

Mr. Yule proceeds at this point to discuss the effects of *social conditions* upon the birth-rate. He finds that the crude birth-rate fell between 1871 and 1901 in both "upper-class" and "lower-class" districts. The fall was 25 and 11 per cent. respectively, but the fertility of married women, as measured by Tait's coefficient, fell only 19 per cent. in the upper-class and not at all in the lower-class districts. He then goes on to show the influence of economic factors on the birth-rate. He finds that there are oscillations in the birth-rate corresponding roughly to the "short-period trade-cycles." Commenting on this, Mr. Yule says:—

The fact that the birth-rate is, apparently, sufficiently sensitive to economic factors to respond even to the short-period cycle, gives at least some presumption that such factors may have been operative to an important extent in bringing about the secular changes that have taken place during the last fifty or sixty years. I confess to a certain prejudice towards the belief that, when deep-seated social changes of this kind occur, there is an economic driving force behind them; that a growing postponement of marriage and increasing limitation of the number of children, both in town and country, are not sufficiently explained by any postulated growth either of prudence on the one hand or immorality on the other.

In order to carry the comparison as far back as possible, birth-rates being unavailable before the Registration Act

of 1838, Mr. Yule gives the following table showing the percentage of increase in population in England in conjunction with index-numbers of prices. This is only a rough test, as no correction for immigration or emigration has been applied.

The percentage increases of population for each intercensal period are given in Table VIII, column 2. For the course of prices I took

TABLE VIII.

| 1 | 2 | 3 | 4 | 5 | 6 |
|-------------|---|-----------|------------------------|-----------|-----------------|
| Period. | Percentage Increase of Population, England and Wales. | Period. | Average Index-number.* | Period. | Average Index.* |
| 1801-11 . . | 14.0 | 1797-1807 | 156 | 1791-1801 | 142 |
| 1811-21 . . | 18.1 | 1807-17 | 156 | 1801-11 | 165 |
| 1821-31 . . | 15.8 | 1817-27 | 124 | 1811-21 | 142 |
| 1831-41 . . | 14.5 | 1827-37 | 101 | 1821-31 | 108 |
| 1841-51 . . | 12.9 | 1837-47 | 96 | 1831-41 | 103 |
| 1851-61 . . | 11.9 | 1847-57 | 89 | 1841-51 | 86 |
| 1861-71 . . | 13.2 | 1857-67 | 99 | 1851-61 | 94 |
| 1871-81 . . | 14.4 | 1867-77 | 100 | 1861-71 | 100 |
| 1881-91 . . | 11.7 | 1877-87 | 81 | 1871-81 | 95 |
| 1891-1901 . | 12.2 | 1887-97 | 61 | 1881-91 | 75 |

Jevons' and Sauerbeck's index-numbers, reducing the former to the standard of the latter in the ratio of their averages during the overlapping years 1846-65. The birth-rate of any year being dependent on the average price level of several years preceding, and therefore lagging behind the price movement, I worked out, for comparison with the increase-rates, the averages of these index-numbers for the eleven-year periods 1797-1807, 1807-17, &c. (column 4). They exhibited an agreement which is certainly fairly close. As the increase-rates fell from 18.1 per cent. in 1811-21 to 11.9 in 1851-61, the average price index-numbers fell from 156 to 89. As the increase-rate then rose from 11.9 to 14.4, the index-numbers rose from 89 to 100. Finally, as the increase-rate fell from 14.4 to 11.7 and 12.2 (the latter unduly large, owing to the low death-rate, and the former unduly low, owing to high emigration), the index-numbers fell from 100 to 61. In column 6 are given the average index-numbers for the eleven years

* Based on Jevons' and Sauerbeck's numbers; the former reduced to Sauerbeck's on the basis of the overlapping years 1846-65.

preceding each census decade, and these exhibit a still closer correspondence, though this may be in part accidental. In the earlier part of the century, prices fluctuated so violently that a few years' difference in the period may make considerable differences in the average. . . . I feel myself almost compelled to the belief that the course of prices, either directly by its influence on consuming power and on profits, indirectly by effects on trade, or more indirectly (if it be possible), as an index to the course of some other variable, has been, through the past century, the factor of most outstanding importance in the rate of reproduction of the race. Let me say again that this is not to exclude the presence of other factors, but merely to rank their importance somewhat lower in the scale.

There remains, however, the fact that the fall in the fertility coefficient was greater for the decade 1891-1901 than for any previous decade, and that this by no means corresponds with the course of prices. There must then have certainly been some other cause or causes at work to effect this depression, and these are probably the same as have effected the corresponding virtual depression of the marriage-rate during the same period. I would like to raise the question whether a contributory cause may not conceivably be the rapidly increasing pressure on the labor market, brought about in part by the high birth-rates immediately preceding 1876, and in part by the great fall in the death-rate, which has enormously increased the supply of adults provided by a given birth-rate. Taking the laboring population as consisting mainly of males between, say, 20 and 55 years of age, I find that their numbers increased by 10 per cent. between 1851 and 1861, by 12 per cent. between 1861 and 1871, by 14 per cent. in each of the following decades, and by no less than 19 per cent. during the ten years 1891-1901. This is a very large and quite abnormal increase, not produced by any present demands for labor, but in part by the "demand" of 1863-73, and in part by a cause which has nothing to do with trade or employment,—the fall in the death-rate. I do not see how such a rapid and uncalled-for rise in the supply of labor could well fail to disturb the market for it, emphasize the problem of unemployment at every recurring trade depression, and tend to lower both marriage and birth-rates amongst the wage-earning classes. If this be, at least, a partial cause so far as these classes are concerned, the next ten or fifteen years should see some relief, for the rate of increase of adults will be rapidly lowered as the recent values of the birth-rate begin to take effect (provided always the death-rates do not fall *pari passu*, as is hardly possible).

Many interesting sidelights were thrown on the points presented in these two papers by the discussion which followed their presentation. Lack of space prevents the reproduction of many of the remarks of the various speakers, but the following have been selected as especially pertinent:—

Mr. Walford said there could not be any doubt that there was only one cause operating in all civilized countries towards the decrease in the birth-rate. Popular magazines openly advertised means for checking the population, and the same facts could be seen in every chemist's shop. This country, however, had not yet advanced so far in this direction as, for instance, Germany. Unless legislation prohibited such advertisements, the Anglo-Saxon race would die out, as other races had died out before. . . .

Mr. G. H. Wood said both writers seemed to have lost sight of the fact that the turning point of the birth-rate of a country did not necessarily mean the turning point of the birth-rates of the separate towns and counties in the country. He objected to calling Dr. Newsholme and Dr. Stevenson's new figure a birth-rate, which it was not, and it ought to be called an "Index of Fertility," or something of that kind. He took the crude birth-rate for this reason: that if one took the table at the end of Dr. Newsholme's paper, and worked out a series of index-numbers for the towns given there, or the counties, and took 1881 as 100, the index-number for 1901 or 1903 was practically the same whether one used the corrected or the uncorrected birth-rate. The one place in which he could see any great variation was Liverpool. . . . It seemed to him there was a more subtle connection between the economic factors and the birth-rate than even the one which Mr. Yule had discovered. Whereas in the net birth-rate of England and Wales and several other countries the turning point was in 1876, the large industrial centres reached the turning point at a much earlier period; and, singularly enough, where women and children had been largely employed in industry, the birth-rate seemed to have arrived at its turning point some time before that for the whole country. 1876 being the date of change for the whole country, the birth-rate in Huddersfield turned in 1872, or earlier; in Preston in 1866 or 1867; in Liverpool in 1864, or earlier; in Bradford, 1870 or 1874; in Aberdeen, 1870; and in Blackburn as early as 1851, with certain other little maxima at 1860, 1868, and 1872, and there was a fall of $7\frac{1}{2}$ per cent. by 1876. In Glasgow, again, it began in 1857. He expected to find, when he got the revised figures for other places,

that the employment of women in industry was really the most serious factor in the change in the birth-rate. . . .

Mr. T. A. Welton said he highly appreciated both these papers, and he agreed with Dr. Newsholme and his colleague as to the social suicide to which they referred as being the main operating cause of the decline in the birth-rate. His attention was called to the subject originally by the discovery that the number of children under 15 appearing in the census of 1901 was about 2,000,000 less than it would have been if the social conditions had remained stationary for twenty years. That was a gigantic fact which required very careful consideration. . . .

Dr. Shadwell said he wished to express his personal gratitude to the authors of these papers. He had studied this subject for a considerable time, not only statistically, but on the spot, in a large number of industrial centres in this country and others. Two years ago he read a paper at Zion College, in which he came to exactly the same conclusion as Dr. Newsholme. Some of the results were particularly interesting to him, amongst them the proof of the great decline in fertility in Berlin and Hamburg. Those cases and others emphasized the conclusion that this process was associated with the rising standard of comfort and the seeking after luxury. Those towns represented pre-eminently the great wealthy cities of pleasure in modern Germany, and it was in such places that this process went on at the most rapid rate. . . . In the United States the vital statistics were almost worthless, but, so far as they went, they showed that the national vitality was lower than even in France; in fact, the native stock was dying out rapidly. In the city of Providence, which had the best statistics in America, the population was roughly divided into two-thirds native and one-third foreign, but the one-third produced two-thirds of the children. Of course the age condition was very different, but the native population went in for small families. Its birth-rate in 1901 was 14.7 per 1,000, and the death-rate was 19.7, or a deficiency of 5 per 1,000. . . .

Dr. Newsholme, in replying for Dr. Stevenson and himself, said . . . Mr. Wood considered that the crude birth-rates were equally as good as the corrected rates for short periods, but numerous instances had been given in their paper showing that the crude rates might be most misleading. The question of using the term "index of fertility" instead of "corrected birth-rate" was one of wording, but the use of "corrected birth-rates" was completely analogous to that of "corrected birth-rate" by the Registrar-General. . . .

Mr. Yule said that he concurred with nearly all the remarks made by Mr. Newsholme, and might accordingly abbreviate his own reply. He said . . . the question of the employment of women in industry and its influence on the birth-rate was of the highest importance, and he was glad to know that Mr. Wood's investigations were being continued. . . . In conclusion, he would like to make a few remarks on the general question as to the causes of the decline in the birth-rate, to which Dr. Newsholme had also referred in his reply. From the same data he reached the opposite conclusion. It was precisely the extraordinary similarity of the changes in very widely different countries that made it very difficult for him to accept the purely moral theory. . . . If there had been a change in that way,—and possibly it was the case,—why in the world did this change take place in so many different countries in almost the same year? People did not change their morality in a large number of different countries, or even in one country, at a given point of time without some extremely definite cause; and, if there had been that change in moral tone for which Dr. Newsholme and others argued, he was still inclined to regard economic factors of some kind as lying behind it. It was true, as remarked by Dr. Newsholme, that most of the economic conditions of the countries with which he and Dr. Stevenson had dealt had been very different, but it was the more worth noting that his (Mr. Yule's) investigations had led him to assign the greatest importance to precisely that factor—the course of wholesale prices—which would be very similar all over Europe at least. If there had been a change in “moral tone,” but one brought about by economic factors, the question arose whether there was any real distinction between the two views as expressed by Dr. Newsholme and Dr. Stevenson's paper and his own. Two views were certainly possible. The fall in the birth-rate might be regarded on the one hand as due solely to changes in the environment surrounding the individual, who had remained himself unchanged, or on the other as due to changes in the individual, while the environment was unchanged (in any essential respect). The first was the purely economic theory, the second the moral theory, —whether the changes in the individual were regarded as ultimately due to economic causes or no.

It is apparent from a reading of the papers and the discussion which followed that, while the several investigators differed considerably as to method, they arrived at practically the same results, though not at the same conclusions in their attempts to interpret and account for those results.

As has already been noted, a newspaper discussion followed the publication of these papers, and some extracts from letters in the *Times* may be of interest in this connection.

In a letter in the issue of October 12 Sidney Webb writes as follows:—

“If only the devastating torrent of children could be arrested for a few years,” wrote one of the most sympathetic friends of progress not so very long ago, voicing the opinion of the economists from Malthus to Fawcett, “it would bring untold relief.” Not many years have passed, and his aspiration is fulfilled. One of his Majesty’s Inspectors of Schools, lately revisiting, after some interval, a public elementary school in the centre of London, remarked that, since he was there before, the “babies’ class” had ceased to exist. Between 1896 and 1905 the total population of the County of London is estimated to have increased by 300,000 persons. But the total number of children between three and five years of age who were scheduled by the vigilant school-attendance officers positively fell from 179,426 to 174,359. . . .

What does this continuous fall in the birth-rate mean? What will be its results upon our economic and social relationships, what upon the future of the race? . . . The subject has accordingly been under investigation during the past year by a committee of the Fabian Society; and the present article sets forth some of the results,—formulated, however, by the present writer in his own way, for which the society as a whole has no responsibility.

1. The decline in the birth-rate is not merely the result of an alteration in the ages of the population, or in the number or proportion of married women, or in the ages of these. . . .

2. The decline in the birth-rate is not confined to the towns, nor (so far as England and Wales is concerned, at least) is it appreciably, if any, greater in the towns than it is in the rural districts.

Human fertility may possibly be normally slightly lower in the towns than in the rural districts, and it is sometimes suggested, especially by German authorities, that the fall in the birth-rate is to be accounted for by progressive “urbanization.” But English statistics afford no support to this hypothesis. . . .

3. The decline in the birth-rate is exceptionally marked where the inconvenience of having children is specially felt.

There is not much evidence to be adduced under this head, but what there is is of some significance. . . . It is, therefore, of some significance that the ten towns in all England in which the relative fall in the birth-rate between 1881 and 1901 is most startlingly great are Northampton, Halifax, Burnley, Blackburn, Derby, Leicester, Bradford Oldham, Huddersfield, and Bolton,—all towns in which

an exceptionally large proportion of married women are engaged in factory work, in textiles, hosiery, or boots. I can adduce no statistics of the decline in the birth-rate among the married women teaching in schools; but it is known to be great.

4. The decline in the birth-rate appears to be specially marked in places inhabited by the servant-keeping class. . . .

5. The decline in the birth-rate appears to be much greater in those sections of the population which give proofs of thrift and foresight than among the population at large.

Here we have to leave the carefully corrected birth-rates supplied by Dr. Newsholme, and fall back upon evidence which is statistically less perfect. . . . But it so happens that we do possess, over a term of nearly forty years, the number of children born in one large sample of the population, selected, it might almost be said, solely by the characteristic of thrift. The Hearts of Oak Friendly Society, the largest centralized benefit society in the Kingdom, has now over 272,000 adult male members. This membership belongs to all parts of the United Kingdom, of which it may be said to represent about 3 per cent., or no inconsiderable sample. No one is admitted who is not of good character and in receipt of wages at least 24s. per week. . . . The society consists, in fact, of the artisan and skilled mechanic class with some intermixture of the small shopkeeper and others who have risen into the lower middle class. Among its provisions is the "lying-in benefit," a payment of 30s. for each confinement of a member's wife. Unfortunately, we do not know either the relative proportions of the members who are married or the average age of the wives. There is, however, no reason to think that the proportion of married members has appreciably changed, whilst it is believed that the average age of the members as a whole has risen from about 33 to 37.52; and it may possibly be inferred that there is a corresponding increase in the average age of the wives. Judging from the evidence of the Scottish census of 1855, we might in such an event have expected a falling off in the births, due to this assumed difference of age, of at most 15 per cent. Now, what are the facts? From 1866 to 1880 the proportion of lying-in claims to membership rose slowly from 2,176 to 2,472 per 10,000. From 1881 to 1904 it continuously declined, until in the latter year it reached only 1,165 per 10,000 members. The birth-rate among this population of a million and a quarter persons, distinguished from the rest, so far as is known, only by one common characteristic, that of thrift, has fallen off between 1881 and 1901 by no less than 46 per cent., or a decline nearly three times as great as that during the same period in England and Wales. Taking the whole period of decline, from 1880 down to the latest year for which I have the statistics, 1904, the falling off is over 52 per cent.

A smaller society, the Royal Standard Benefit Society, having 8,225 members and giving a similar benefit, shows similar results. Between 1881 and 1901 the proportion of members claiming the lying-in benefit fell off by more than 56 per cent. If the members of the Hearts of Oak Friendly Society and the Royal Standard Benefit Society had had proportionately as many births in 1904 as the members of 1880 had in that year, there would have been born to them nearly 70,000 babies instead of 32,000. If the birth-rate in these 280,000 families of comparatively prosperous artisans had only fallen in the same degree as that of England and Wales generally, there would have been born to them 58,000 babies instead of 32,000. What was the special influence in these exceptionally thrifty families that prevented the other babies being born?

6. The decline in the birth-rate is due to some new cause which was not appreciably operative fifty years ago. . . .

In 1851, as in 1901, it could have been inferred from a comparison of different districts in the metropolis that "the more cultured, the more prosperous, healthy, and thrifty classes of the community" were producing fewer children per marriage than the classes of lower social *status*. But, as regards London in 1851, Mr. Heron is "driven to almost certain conclusion that differences in the mean age of wives were amply sufficient . . . to account for the differential birth-rates of districts with divergent social *status*." The operating cause of a low birth-rate was, in fact, at that date, postponement of marriage. We know, however, from Dr. Newsholme's corrected birth-rates that no such cause as a greater postponement of marriage, with the corresponding rise in the age of the average wife, has anything to do with the decline in the birth-rate now recorded. This decline is due to some cause other than those that were appreciably in operation in 1851.

7. The decline in the birth-rate is principally, if not entirely, the result of deliberate volition in the regulation of the marriage state.

The reader can scarcely have read the foregoing statements without coming to the conclusion that the falling-off in the birth-rate, which has during the last twenty years deprived England and Wales of some two hundred thousand babies a year, is the result of deliberate intention on the part of the parents. . . .

We may add other evidence. Among the Roman Catholics in the United Kingdom any regulation of the marriage state is strongly forbidden, and has during recent years been made the subject of frequent, special animadversion, both privately and from the pulpit. It is significant that Ireland is the only part of the United Kingdom in which the birth-rate has not declined; that in Ireland itself it has

declined a little in semi-Protestant Belfast, and not at all in Roman Catholic Dublin; and that in the towns of Great Britain the decline is least in Liverpool, Salford, Manchester, and Glasgow,—towns in which the proportion of Roman Catholics is considerable. All this is inconsistent with the hypothesis that the decline is due to physical degeneracy, and consistent with that of its being due to deliberate volition. Common report that such deliberate regulation of the marriage state . . . has become widely prevalent during the past quarter of a century—exactly the period of the decline—reaches us from all sides,—from doctors and chemists, from the officers of friendly societies and philanthropists working among the poor. . . .

The conclusions reached by Mr. Webb are practically the same as those already noted in the articles under discussion, but they are supported by some new evidence, and are given added significance by the indorsement of a man of such wide experience and profound knowledge of social and economic conditions in England. In a second letter Mr. Webb presents still further evidence in support of his last point. This letter is not published in full, and the following extracts are from the summary which appeared in the *Times*, October 19:—

Mr. Sidney Webb, in his second article on this subject, gives the result of a voluntary census taken by the Fabian Society “from a sufficiently large number of married people who could be relied upon to give frank and truthful answers to a detailed interrogatory. For this information resort was had to between 600 and 700 persons, from whom the committee had grounds of hope that answers would be received. About half of these persons resided in the metropolitan area, the remainder being scattered sparsely over the rest of Great Britain. In social grade they included a most varied selection of occupations.” One of the questions was whether any steps had been taken to limit the number of children.

In the result, “of the 316 marriages, 74 are returned as unlimited and 242 as limited.” Mr. Webb continues:—

“If we take the decade 1890–99, which may be regarded as the typical period, we find that out of 120 marriages 107 are limited and 13 unlimited, whilst of these 13 five, and possibly six, were childless at the date of the return. *In this decade, therefore, only seven or possibly eight unlimited fertile marriages are reported out of a total of 120.*

"The confidential voluntary census thus taken is, of course, far too small to be in itself any proof of a wide-spread custom. But, taken in conjunction with the very extensive statistical evidence already adduced, it seems to me to complete the demonstration. We must, I think, now take it as proved that the principal, if not the sole, cause of the present continuous decline in the birth-rate in Great Britain is the deliberate regulation of the marriage state. . . . Nor is the practice confined to this country. . . . It is clear that the American-born inhabitants of New England, and perhaps throughout the whole of the Northern States, are rapidly following suit. The same phenomenon is clearly to be traced in the German Empire, especially in Saxony, Hamburg, and Berlin, but the German rural districts are as yet unaffected. The Roman Catholic population of Ireland (and of the British cities), as well as those of Canada and Austria, appear to be still almost untouched, but those of Belgium, Bavaria, and Italy, are beginning to follow in the footsteps of France." . . .

In the October 26th issue Karl Pearson has a letter, in which he corrects certain statements attributed to him by other correspondents and criticises some of the statistics by which Mr. Webb supports his conclusions, particularly those based on the Fabian census:—

I do not doubt the accuracy of Mr. Webb's figures, but I feel pretty convinced from data in my own possession that they are drawn largely from the "intellectuals," whether among the middle or better working classes. The Fabians have provided us for many years with instruction and amusement,—with economists, essayists, and dramatists. It will be a great loss if the next generation has but few Fabians. But statistics drawn from their entourage do not apply to the nation at large. They only illustrate my third point,—that, unfortunately, the limitation is differential, and that ability too often goes childless. I have been for some years collecting statistics of the relative size of families to-day and a generation ago. I have endeavored to do this without bias of any kind by issuing schedules merely asking for the number of relatives in two generations, *i.e.*, the number of recorder's brothers and sisters, dead and alive, and of the parents' brothers and sisters. My collection is far from complete, but I think, so far as it goes, it may be placed against Mr. Webb's results,—not necessarily to contradict them, but to temper the conclusions which the Fabian census would induce some to draw. Mr. Heron has kindly reduced the data for me. All the marriages have lasted fifteen or more years.

All barren marriages are excluded. It is impossible to say whether such are limited or not. 1,205 marriages in all were dealt with. The average number of offspring in the recent marriages was 6.40, and in the parental marriages 6.68. The difference, less than one-third of a child, is small, but of course significant. Other statistics I have show me that about 13 per cent. of marriages are now childless. This would reduce the average number of children born, not necessarily living, in present-day marriages to about 5.6, possibly slightly more, as all 15-year marriages are not completed.

Do I set this 5.6 against Mr. Sidney Webb's 1.5? Not in the least. He has got his census taken in one stratum: mine is taken in another. What both censuses demonstrate is my point,—that the limitation is differential. And the great problem is whether limitation has not begun at the wrong end.

Mr. Pearson, in a later issue of the *Times* (November 2), in replying to a number of questions raised by another correspondent, reaffirms his essential agreement with Mr. Webb as follows, referring to the cause of the declining birth-rate:—

Mr. Sidney Webb believes it is largely volitional. So do I. Probably we differ as to the extent of its differential character. I think that the smallness of families is unfortunately largely correlated with good social *status*, by which I understand that the better citizens in health, ability, and craftsmanship, have to-day fewer children than the weak, dull, and improvident.

Other writers add their testimony, and in most cases signify their approval of both the methods and the results set forth in these articles. There is some criticism and disagreement on minor points, and yet we may feel convinced, I think, that what has hitherto been more or less of a general belief or vague impression is now supported by substantial proof in the form of accurate and well-tested statistics. Moreover, we may look for increased activity, for a time at least, in the gathering of data along these lines.

APPENDIX.

TABLE I.—DIVISIONS OF

| | | 1 | 2 | 3 | 4 | 5 |
|--------------------|-----------------------|---------------------------------------|---|------------------------------------|--|--|
| | | Standard Legitimate Birth-rate. | Factor for Correction of Crude Legitimate Birth-rate. | Crude Legitimate Birth-rate. | Corrected Legitimate Birth-rate. | Factor for Correction of Illegitimate Birth-rate. |
| ENGLAND AND WALES | 1901 | 34.91 | 1 | 27.29 | 27.29 | 1 |
| | 1891 | 33.63 | 1.0381 | 30.1 | 31.25 | 1.055 |
| | '81 | 34.34 | 1.0166 | 32.2 | 32.73 | 1.131 |
| | '71 | 34.78 | 1.0037 | 33.0 | 33.12 | 1.142 |
| | '61 | 34.95 | 0.9989 | 32.4 | 32.36 | 1.109 |
| | Selected urban | 1901 | 36.90 | 0.9461 | 28.75 | 0.985 |
| | counties* . . . | 1881 | 36.79 | 0.9489 | 33.83 | 1.101 |
| | Selected rural | 1901 | 29.68 | 1.1762 | 23.83 | 1.045 |
| | counties . . . | 1881 | 29.36 | 1.1890 | 28.67 | 1.184 |
| | All urban districts† | 1901 | 36.40 | 0.9591 | — | 0.963 |
| | All rural districts . | 1901 | 29.98 | 1.1644 | — | 1.147 |
| SCOTLAND ‡ § . . . | 1901 | 30.18 | 1.1567 | 27.36 | 31.65 | 0.944 |
| | 1881 | 29.57 | 1.1806 | 30.89 | 36.47 | 1.007 |
| | North Scotland § | 1901 | 26.83 | 1.3011 | 24.54 | 0.922 |
| | | 1881 | 25.89 | 1.3484 | 27.83 | 0.971 |
| | South Scotland . | 1901 | 32.35 | 1.0791 | 29.16 | 0.961 |
| | | 1881 | 32.32 | 1.0801 | 33.16 | 1.035 |
| | Scotland N. . . | 1901 | 20.04 | 1.7420 | 19.57 | 0.938 |
| | | 1881 | 20.18 | 1.7299 | 22.68 | 0.924 |
| | Scotland N.W. . | 1901 | 20.53 | 1.7004 | 21.32 | 0.913 |
| | | 1881 | 21.06 | 1.6576 | 24.72 | 0.915 |
| | Scotland S.W. . | 1901 | 33.92 | 1.0292 | 31.43 | 1.021 |
| | | 1881 | 34.05 | 1.0253 | 35.06 | 1.095 |
| IRELAND | 1901 | 22.05 | 1.5832 | 22.48 | 35.59 | 0.835 |
| | 1881 | 24.06 | 1.4510 | 23.84 | 34.59 | 0.938 |
| | Leinster | 1901 | 23.15 | 1.5080 | 22.55 | 0.811 |
| | | 1881 | 24.76 | 1.4099 | 23.96 | 0.890 |
| | Ulster | 1901 | 23.80 | 1.4668 | 23.51 | 0.813 |
| | | 1881 | 24.24 | 1.4402 | 23.78 | 0.863 |
| | Munster | 1901 | 19.86 | 1.7578 | 21.82 | 0.851 |
| | | 1881 | 23.00 | 1.5178 | 23.67 | 1.018 |
| | Connaught . . . | 1901 | 19.43 | 1.7967 | 21.14 | 0.919 |
| | | 1881 | 24.22 | 1.4414 | 23.31 | 1.095 |

* The special urban counties and rural counties are two groups selected by the Registrar-General ("Annual Report," 1903, p. xliv), the first including the chief industrial centres, and comprising a population in 1903 of 18,039,289, the second comprising only a few unimportant towns, but with an aggregate population of 4,314,254. According to the Census Report the first group comprises 89 per cent. of its total population in urban districts, the second group 42 per cent. in urban districts. Many of the urban districts in the second group are doubtless only villages, while in the first group are many large as well as smaller towns.

† The population of all the urban districts of England and Wales in 1901 was 25,058,355, of all the rural districts 7,469 488.

APPENDIX.

UNITED KINGDOM.

| 6 Crude Illegitimate Birth-rate. | 7 Corrected Illegitimate Birth-rate. | 8 Crude Total Birth-rate. | 9 Corrected Total Birth-rate. | 10 11 Number per 1,000 of Total Population of | | 12 Wives Aged 15-45 per Cent. of all Females of same Age. |
|---|---|------------------------------------|--|---|----------------------|--|
| | | | | Females Aged 15-45. | Wives Aged 15-45. | |
| 1.12 | 1.12 | 28.41 | 28.41 | 249.7 | 117.0 | 46.8 |
| 1.3 | 1.37 | 31.4 | 32.62 | 237.6 | 111.8 | 47.1 |
| 1.7 | 1.92 | 33.9 | 34.65 | 230.6 | 113.3 | 49.1 |
| 2.0 | 2.28 | 35.0 | 35.40 | 230.7 | 114.5 | 49.6 |
| 2.2 | 2.44 | 34.6 | 34.80 | 235.3 | 115.6 | 49.1 |
| 1.11 | 1.09 | 29.86 | 28.29 | 257.1 | 122.4 | 47.6 |
| 1.63 | 1.79 | 35.46 | 33.89 | 240.9 | 120.4 | 50.0 |
| 1.30 | 1.36 | 25.13 | 29.39 | 229.8 | 102.8 | 44.8 |
| 1.87 | 2.21 | 30.54 | 36.30 | 211.4 | 99.3 | 47.0 |
| — | — | — | — | 258.9 | 121.1 | 46.8 |
| — | — | — | — | 218.6 | 102.9 | 47.1 |
| 1.83 | 1.73 | 29.19 | 33.38 | 242.1 | 101.6 | 42.0 |
| 2.80 | 2.82 | 33.69 | 39.29 | 230.7 | 98.9 | 42.9 |
| 1.94 | 1.79 | 26.48 | 33.72 | 236.3 | 92.3 | 39.1 |
| 2.91 | 2.83 | 30.74 | 40.36 | 225.2 | 88.5 | 39.3 |
| 1.76 | 1.69 | 30.92 | 33.16 | 245.8 | 107.7 | 43.8 |
| 2.72 | 2.82 | 35.88 | 38.64 | 234.9 | 106.7 | 45.4 |
| 1.37 | 1.29 | 20.94 | 35.38 | 213.7 | 72.2 | 33.8 |
| 1.81 | 1.67 | 24.49 | 40.90 | 215.1 | 71.5 | 33.2 |
| 1.32 | 1.21 | 22.64 | 37.46 | 220.2 | 74.9 | 34.0 |
| 1.70 | 1.56 | 26.42 | 42.54 | 219.7 | 74.7 | 34.0 |
| 1.69 | 1.73 | 33.12 | 34.08 | 241.8 | 111.8 | 46.2 |
| 2.59 | 2.84 | 37.65 | 38.79 | 232.8 | 111.6 | 47.9 |
| 0.59 | 0.49 | 23.07 | 36.08 | 235.4 | 76.5 | 32.5 |
| 0.62 | 0.58 | 24.46 | 35.17 | 225.1 | 83.6 | 37.1 |
| 0.61 | 0.49 | 23.16 | 34.50 | 243.4 | 79.7 | 32.7 |
| 0.54 | 0.48 | 24.50 | 34.26 | 234.7 | 85.6 | 36.5 |
| 0.82 | 0.67 | 24.33 | 35.15 | 244.4 | 81.2 | 33.2 |
| 1.02 | 0.88 | 24.80 | 35.13 | 237.4 | 83.7 | 35.2 |
| 0.52 | 0.44 | 22.34 | 38.80 | 226.2 | 70.3 | 31.1 |
| 0.43 | 0.44 | 24.10 | 36.37 | 211.4 | 81.0 | 38.3 |
| 0.11 | 0.10 | 21.25 | 38.08 | 214.2 | 69.8 | 32.6 |
| 0.19 | 0.21 | 23.50 | 33.81 | 205.5 | 84.3 | 41.0 |

‡ All the recent Scottish birth-rates are for 1902, all others for 1903.

§ Scotland is divided for registration purposes into eight divisions, termed Scotland N., Scotland N.W., etc. The three northern and two midland divisions make up North Scotland, and the three southern South Scotland. The statistics for these two main divisions of Scotland are given first in the table, then follow statistics for three of the subdivisions, which have been selected from the eight as likely to show the greatest extremes of birth-rates. Of these Scotland N. includes the counties of Orkney, Shetland, Caithness, and Sunderland; Scotland N.W. includes Ross and Cromarty and Inverness; and Scotland S.W. includes Renfrew, Ayr, and Lanark.